

EUREKA PROJECT E!1916 - GRASSMARKERS

1. General description

Project	E! 1916 - GRASSMARKERS	Status	Announced - 30-JUN-1998
Title	Development Of A Specific Molecular Market Technology For Use In Selection On Disease Resistance In Grasses.		
Class	Project	Technological area	Medical and Biotechnology
Start date	01-MAR-1998	End date	01-MAR-2002
Duration	48 months	Total cost	0.56 Meuro
Partner sought	No		
Summary	The Aim To To Develop A Screening Method To Determine The Presence Of Disease Resistance Genes On Molecular Markers. This Can Improve The Effectiveness Of Breeding To Produce Better Disease Resistance In Grasses.		

Budget and duration

Phase	Budget(Meuro)	Duration (Months)
Implementation phase	0.56	48
Total	0.56	48

Member contribution

Member	Contribution	Position	Since
The Netherlands	72.00%	Contact Member	13-FEV-1998
United Kingdom	28.00%	Participating Member	30-JUN-1998

Participants

Company	Country	Type	Role
BARENBRUG HOLLAND B.V.	THE NETHERLANDS	SME	Main
QUEENS UNIVERSITY OF BELFAST/AGRICULTURE & FOOD SCIENCE CEN.	UNITED KINGDOM	University	Partner

2. Project outline

Project description

Forage and turf grasses suffer from rust (*Puccinia coronata*) and various other important diseases. These diseases lower the forage quality and the healthiness of the grass plants. Chemical treatment of diseases is a less attractive option than breeding varieties with better disease resistance for economic, health and environmental reasons.

Selection in the field for better disease resistance in grasses, however, is not very reproducible, because the occurrence of diseases on plant breeder's fields depends on the weather and the climate. The direct selection on disease resistance is also time consuming since diseases often occur only in older plants. Indirect selection using molecular markers closely linked to resistance genes could considerably improve the effectiveness of the selection process. This project aims to develop such molecular markers for selection of improved disease resistance in grasses.

Different grass genotypes will be artificially infected with different populations of rust spores in controlled climate rooms. The presence or absence of resistance against the different rust populations will be scored. Differences between plants in resistance pattern will then be compared to differences in DNA marker profile, using existing PCR-based protocols. Markers for specific resistance genes will be identified. High throughput screening methodology will be developed, based on these molecular markers. This methodology will subsequently be implemented in applied grass breeding programmes. A large number of grass genotypes selected using the developed markers will be tested on trial fields in HOLLAND and FRANCE. The effectiveness of the methodology will be checked. Potential negative correlations of improved disease resistance with other important characteristics will be assessed.

Keywords: grasses, markers, diseases.

Technological development envisaged

In three years from the beginning of the project we at BARENBRUG HOLLAND B.V. will be able to screen grass seedlings for the presence of certain resistance genes. This will be done with PCR primers designed from selected markers. At the end of the project we will have confirmed that the selection with molecular markers is feasible and gives the desired results. We will also know about any possible negative correlations between the improved rust resistance and other desired characteristics of grasses. Grass varieties with improved and durable resistance to diseases will be selected using the developed markers. The market technology developed will make it possible to combine several very different resistance genes into one variety, which is not possible using conventional techniques. Disease resistance based on more and different resistance genes is more durable and will not be broken down as easily by newly formed strains of the pathogen.

The level of disease resistance is also higher with more resistance genes combined in a variety of grass.

Markets application and exploitation

In many countries e.g. in the U.S.A., AUSTRALIA and CHINA, disease resistance plays a major role in the successful commercialisation of a variety. The world market in grass seed is estimated at about 720 MECU per year, of which 15 MECU is in the NETHERLANDS. Our competitiveness on this world market could rise considerably if we are able to select more effectively for disease-resistant varieties, with advanced molecular marker technology. Besides increasing our market share worldwide, we can reach our selection goals faster with the help of molecular markers compared to selection on trial fields alone. This is of strategic importance, as the commercial life-cycle of varieties is getting shorter in most countries.

Project codes

BSI

VL	biotechnology
VLS	genetic engineering

NACE

01	Agriculture, hunting and related service activities
011	Growing of crops; market gardening; horticulture
014	Agricultural and animal husbandry service activities, except veterinary activities

3. Main participant

Company **BARENBRUG HOLLAND B.V.**
THE NETHERLANDS

Tel +31 481 488 100
Fax +31 481 486 139

www.barresearch.nl

Contact **IR. LAURENS BEEREPOOT**
Director Of Research

Tel
Fax

lbeerepoot@barenbrug.com

Organisation type SME
Participant role Main

Contribution to project

Will supply suitable resistant and susceptible genotypes. Rust spores collection on trial fields in HOLLAND/FRANCE. Infection of plants with rust spores. Developed PCR markers will be tested. Improved resistance will be confirmed.

Expertise

4. Partner

Company **QUEENS UNIVERSITY OF BELFAST/AGRICULTURE &
FOOD SCIENCE CEN.**
Newforge Lane,
Bt9 5pxBelfast
UNITED KINGDOM

Tel +44 1232 255 247
Fax +44 1232 668 375

Contact **PROF. PETER BLAKEMAN**
Departmental Head

Tel
Fax

Organisation type University
Participant role Partner

Contribution to project

Will do the molecular biological research work involved. Unique DNA sequences potentially connected to resistance will be isolated and analysed. PCR markers will be developed. PCR screening expertise will be transferred.

Expertise